



2005 Minerals Yearbook

THE GAMBIA, GUINEA-BISSAU, AND SENEGAL

THE MINERAL INDUSTRIES OF THE GAMBIA, GUINEA-BISSAU, AND SENEGAL

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THE GAMBIA

The Gambia is a West African country that is bounded to the west by the Atlantic Ocean and to the east, north, and south by Senegal. The country's estimated 1.6 million inhabitants share a total land area of about 10,000 square kilometers (km²). Mining, which was limited to the production of clay, laterite, sand and gravel, silica sand, and zircon, did not play a significant role in the Gambian economy. International Monetary Fund (2006§¹) reports indicate that the country's gross domestic product (GDP) based on purchasing power parity was \$3.02 billion in 2005. Exports, which were valued at \$114.4 million in 2004, included cotton, fish, lint, palm kernels, and peanut products (U.S. Central Intelligence Agency, 2005§).

The Department of State for Trade, Industry, and Employment was the Government entity responsible for the administration of the mining sector. A new mineral and mining law proposed in 2001 was still under consideration for approval by the Government in 2005 [Mbendi Information Services (Pty.) Ltd., 2006§]. The Department of State for Finance and Economic Affairs of the Gambia (2006) reported that the Government had put in place policies to attract foreign direct investment, including free repatriation of capital and profits, special investment certificates, and constitutional guarantees and safeguards against nationalization and expropriation of investments.

Carnegie Corporation Ltd. (CCL) of Australia (50%) in joint venture with Astron Ltd. of China (50%) held an exclusive prospecting license for the Batukunku, the Kartung, and the Sanyang mineral sands deposits in Brufut. In 2005, the joint venture completed a second-round trial dredge program at the Sanyang deposit. Following the completion of this dredge program and of an environmental impact assessment study, the company submitted an application to convert its prospecting license to a mining lease. As of yearend, CCL continued to wait for Government approval. Total measured, indicated, and inferred resources at the Batukunku, the Kartung, and the Sanyang deposits were estimated to be 18.8 million metric tons (Mt) that contained about 1 Mt of heavy minerals at a cutoff grade of 1%. The heavy-mineral assemblage for these deposits was estimated to be about 71% ilmenite, 15% zircon, 3% rutile, and 11% other (Carnegie Corporation Ltd., 2005, p. 7-9; Industrial Minerals, 2005a, b).

In terms of the country's infrastructure, a rural electrification project was scheduled to be commissioned in 2006 that would provide electricity to 46 rural towns and villages. According to the Department of State for Finance and Economic Affairs

of the Gambia (2006, p. 5), the demand for electricity in The Gambia far outweighs supply, and electricity supply is one of the Government's greatest challenges.

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GUINEA-BISSAU

Guinea-Bissau is a West African country that is bounded to the west by the Atlantic Ocean, to the north by Senegal, and to the east and south by Guinea. In 2005, the population was estimated to be about 1.4 million. The country's total land and water area, which included 60 islands, is 36,120 km² (U.S. Central Intelligence Agency, 2006§). Mining in Guinea-Bissau was limited to small-scale production of construction materials, such as clays, granite, limestone, and sand and gravel. The country's prospective minerals include bauxite, diamond, gold, heavy minerals, petroleum, and phosphate rock. In 2005, the GDP based on purchasing power parity was estimated to be about \$1.2 billion (International Monetary Fund, 2006§). According to U.S. Central Intelligence Agency statistics, in 1999 (the latest year for which statistics were available) agriculture, which was the mainstay of the economy, accounted for about 62% of the GDP followed by services (26%) and industry (12%). Exports, which were valued at \$54 million in 2002, consisted of cashew nuts, lumber, peanuts, palm kernels, and shrimp (U.S. Central Intelligence Agency, 2006§).

Red Back Mining Inc. through its subsidiary Champion Industrial Minerals (CIM) held a mining lease for the Farim phosphate deposit, which was located about 100 kilometers (km) northeast of Bissau. After completing a technical and

¹References that include a section mark (§) are found in the Internet References Cited sections.

market evaluation of the Farim phosphate deposit, the company concluded in 2003 that the project had advanced to a stage where it required a level of developmental, operational, and marketing expertise that was beyond CIM's capacity; since that time, the company has attempted to either locate a suitable partner to develop the Farim deposit or to sell it. The company was unsuccessful in both endeavors and, in 2005, continued to keep the Farim project on care and maintenance status. The Farim phosphate rock deposit had estimated resources of more than 166 Mt at a grade of 29% P₂O₅ (Red Back Mining Inc., 2006, p. 3; 2006§).

Premier Oil plc of the United Kingdom held exploration licenses for five blocks offshore Guinea-Bissau, namely Block 2, Block 4a, Block 5a, Block 7b, and Block 7c. The company's interest in these blocks was 38.5%, 42%, 42%, 23.75%, and 23.75% respectively. In 2005, Premier acquired three-dimensional (3-D) seismic survey data for a 400-km² area and reprocessed existing 3-D seismic data for the Eirozes and the Espinafre salt-diapir prospects, which cover an 800-km² area. Premier planned to operate wells back-to-back on these two prospects in 2006 (Premier Oil plc, 2006, p. 10).

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SENEGAL

Senegal is a West African country that is bounded to the west by the Atlantic Ocean, to the northeast by Mauritania and Mali, and to the south by Guinea. The country's estimated 11.1 million inhabitants share a total land area of about 192,000 km². Phosphate rock production, which was the country's second most significant foreign exchange earner, dominated Senegal's mining sector (U.S. Department of State, 2006§). Other mineral commodities produced were basalt, cement, clays, gold, laterite, limestone, natural gas, and sand. In 2005, the GDP based on purchasing power parity was estimated to be \$20.5 billion. Export estimates were valued at about \$1.4 billion and consisted mainly of cotton, fish, peanuts, refined petroleum products, and phosphate rock (International Monetary Fund, 2006§; U.S. Central Intelligence Agency, 2006§).

Commodity Review

Metals

Gold.—At least five companies were exploring for gold in Senegal in 2005, among which were Axmin Inc. (Axmin), IAMGOLD Corp. (IAMGOLD), and Oromin Explorations Ltd. (Oromin) of Canada; Mineral Deposits Limited (MDL) of Australia; and Randgold Resources Ltd. (Randgold) of the United Kingdom. Axmin held exploration permits for the Heremakono, the Sabodala NW, and the Sonkounkou properties, which lie within the Kedougou-Kenieba inlier of the Birimian gold belt that borders Mali. IAMGOLD, which had been exploring in Senegal since the early 1990s, reported that it had spent about \$1.9 million in 2005 to complete a diamond drilling program at its Bambadji gold project in the eastern part of the country. Upon completion of the drilling program, the company reported that mineralization was not considered to be continuous at its target zones and announced that it would focus on conducting detailed geologic and geophysical surveys at Bambadji in 2006 with a budget of \$1 million (IAMGOLD Corp., 2006, p. 22, 45).

Oromin Joint Venture Group (OJVG), which was a 50-50 joint venture of Oromin and Bendon International Ltd. of Saudi Arabia, was granted an exploration license for 230 km² within the Sabodala gold belt in eastern Senegal in February 2004. The company was to conduct an \$8 million exploration program at Sabodala during a period of 22 months. OJVG's initial exploration program included ground and airborne geophysics, geochemistry surveys, and about 4,000 meters of drilling at the Golouma and the Kobokoto prospects and at the Sabodala South deposit. The company planned to conduct additional drilling of up to at least 10,000 meters in 2006 (Oromin Explorations Ltd., 2005a-d; 2005a§, b§).

MDL held an exploration permit for a 20.3-km² concession within the Sabodala gold belt in southeastern Senegal, which was located about 650 km from Dakar and was adjacent to Oromin's Sabodala gold concession. A joint venture of MDL (70%) and Senegalese private interests (30%) was granted the exploration permit in October 2004. In March 2005, a mining convention for the development of the concession was signed by the Government, and MDL exercised its option to acquire the remaining 30% minority interest after purchasing 9 million common shares and committing to pay \$5 million by March 1, 2006. Under the terms of the mining convention, MDL will manage the holding company, Sabodala Mining Company SARL, after March 1, 2006. The Government will hold the remaining 10% interest in the venture (Mineral Deposits Limited, 2005a, d; 2006, p. 18-22).

In June 2005, MDL hired RSG Global to conduct a 20,000-meter-reverse circulation drilling program at Sabodala and appointed Ausenco Limited as the principal engineering contractor for the project. MDL planned to complete an additional 40,000- to 50,000-meter drilling program at Sabodala by April 2006. On October 25, 2005, MDL announced that it had acquired an exploration permit for the Bransan, the Dembala Berola, and the Massa Kounda properties in Senegal.

The Bransan property is located about 5 km from the company's Sabodala project and was being explored by a joint venture of MDL (70%) and Senegalese private interests (30%). The joint venture committed \$1 million for exploration during a period of 3 years. The Dembala Berola and the Massa Kounda properties are located farther north of the Sabodala project and were being explored by a joint venture of MDL (80%) and Senegalese private interests (20%) (Mineral Deposits Limited, 2005b-d).

Randgold held four exclusive exploration permits in Senegal for an area that covers 1,326 km² within the Sabodala gold belt. The company held a 90% interest each in the Kanoumering, the Kounemba, and the Tomboronkoto permits, and a 63% interest in the Makana permit. In 2005, 3 of the 31 gold targets identified by Randgold were subjected to reconnaissance drilling, 5 were subjected to advanced drilling, and 7 were dropped (Randgold Resources Ltd., 2006, p. 9, 27).

Heavy Minerals.—Among the companies engaged in the exploration of Senegal's mineral sands deposits was the joint venture of MDL and CCL of Australia and Astron of China. MDL held a mining lease for the development of the Grand Côte Zircon Project (GCZP), which is a mineral sands deposit located on the northern coast of Senegal. The deposit, which had been explored by DuPont Chemicals in the 1990s, was located about 100 km north of Dakar and extended northward for more than 50 km. DuPont Chemicals' previous work had confirmed resources of about 19 Mt of ilmenite, 1.7 Mt of zircon, and 950,000 t of HiTi (a mix of rutile and leucosene). In April 2004, MDL invested \$2.55 million in exploration and prefeasibility studies at GCZP and began the engineering and environmental work for a bankable feasibility study (Mineral Deposits Limited, 2005e, p. 4-9). In 2005, the company focused on putting in place the necessary infrastructure, equipment, and personnel needed to complete the feasibility study. As of yearend 2005, inferred resources at GCZP were reported to be 801 Mt of ore at a grade of 2.6% heavy minerals. MDL envisioned an operation that would produce about 75,000 t/yr of zircon and 14,000 t/yr of rutile/leucosene; first production was expected to begin in 2007 (Mineral Deposits Limited, 2006, p. 8, 16).

In December 2004, CCL and Astron were granted an exclusive exploration license to explore for mineral sands in 750 km² of coastal area in southern Senegal. The license covered an area that extends southward from the Gambian border to about 4 km from the company's existing mineral sands project at Brufut. A preliminary reconnaissance study conducted in 2005 yielded heavy mineral grades of from 17% to 52% and a heavy mineral assemblage similar to the Gambian deposits. CCL planned to conduct a wide-spaced drilling program for the area in 2006 followed by drilling below the water table (Carnegie Corporation Ltd., 2004; 2006, p. 10; Industrial Minerals, 2005a, b).

Iron and Steel.—Société des Mines de Fer du Senegal Oriental (MIFERSO) was the Government-owned company in charge of the development of the Faleme iron ore deposit, which is located in southeastern Senegal. In 2004, Kumba Resources Limited of South Africa (KRL), through its subsidiary Kumba International BV, signed an agreement with MIFERSO to conduct a prefeasibility study at Faleme. At the time, KRL reported that the development of the Faleme deposit would

require not only the development of the mine and associated infrastructure, but the construction of 311 km of railway line to complete the 741 km of railway line needed to transport the iron ore from the mine to a deepwater port in Dakar, which would also need to be constructed. The preliminary cost of these undertakings was estimated to be about \$950 million. Resources at Faleme were estimated to be 260 Mt of ore that contain 58% iron (Kumba Resources Limited, 2004). Upon completion of the prefeasibility study in November 2005, the company exercised its option to acquire an 80% interest in the Faleme project and began a bankable feasibility study for the integrated development of the mine and infrastructure. As of yearend 2005, MIFERSO had put the company's rights to the project under dispute and KRL reported that it would pursue the necessary legal actions to preserve its contractual rights. The envisioned operation at Faleme was expected to produce up to 12 million metric tons per year (Mt/yr) of iron ore, and first production was scheduled for the end of 2008 (Kumba Resources Limited, 2006, p. 44).

Industrial Minerals

Phosphate Rock.—Calcium phosphate rock production totaled about 1.5 Mt in 2005 compared with a revised 1.6 Mt in 2004; phosphoric acid production dropped to 504,000 metric tons (t) in 2005 from 569,000 t in 2004 (table 1). Phosphate ore was mined from the Keur Mor Fall and the Tobene deposits within the Taiba Mine. Part of the marketable phosphate rock was sent to Industries Chimiques du Sénégal (ICS)'s phosphoric acid plants in Darou Khoudoss, and the remainder was sent to the Dakar port for export. ICS was Senegal's phosphate rock mining and processing company. The Government of India, through Indian Farmers Fertilizer Cooperative Ltd. (IFFCO), and Southern Petrochemicals Industries Corporation Ltd. (SPIC) were equity partners in ICS. IFFCO and SPIC collectively held about 30% interest in the company. The facilities at Darou consisted of two adjacent phosphoric acid production plants that had a combined production capacity of 660,000 metric tons per year (t/yr) of P₂O₅. Most of the phosphoric acid produced was exported to India. The company also imported solid sulfur to produce sulfuric acid at the plant. In addition, ICS owned a fertilizer manufacturing unit at Mbao, which is located about 18 km from Dakar. The plant had a production capacity of 250,000 t/yr. In 2005, fertilizer production decreased to 146,000 t from 210,000 t in 2004 (table 1). Fertilizers were produced by combining phosphoric acid with ammonia and potash. Most of the fertilizer produced was sold to West African agriculture markets for the cultivation of cotton, peanuts, and vegetables (Industries Chimiques du Sénégal, 2006§).

Infrastructure

Senegal's national electricity company, Compagnie Sénégalaise d'Electricité (SENELEC), was responsible for generating, transmitting, and distributing the majority of Senegal's electricity. In May 2005, the Board of Executive Directors of the World Bank Group approved a financing

package in support of Senegal's electricity sector, which consisted of a loan from the International Finance Corporation of about \$21.7 million² and an International Development Association risk guarantee of \$7.2 million. The loan and risk guarantee were for the Kounoune I Independent Power Project (KIPP), which was a 67.5-megawatt electricity generation plant to be developed in Kounoune east of Dakar. The plant, which was being developed by Matelec S.A.L. (a division of the Doumet Group of Lebanon) and MHI Equipment Europe B.V. (a subsidiary of Mitsubishi Heavy Industries Ltd. of Japan), was to sell electricity to SENELEC under a 15-year purchase agreement (International Finance Corporation, 2005a§, b§).

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²Where necessary, values have been converted from European Union euros (€) to U.S. dollars (US\$) at the average rate of €1.27470=US\$1.00 for 2006.

TABLE 1
THE GAMBIA AND SENEGAL: PRODUCTION OF MINERAL COMMODITIES¹

(Thousand metric tons unless otherwise specified)

Country and commodity	2001	2002	2003	2004 ^c	2005 ^c
THE GAMBIA²					
Clay ³ metric tons	2,000 ^e	11,814 ⁴	12,375 ⁴	13,655 ^{r, 4, 5}	13,700
Laterite ³	NA	410	227 ⁴	245 ^{r, 4, 5}	250
Silica sand ³	170 ^e	1,508 ⁴	1,534 ⁴	1,389 ^{r, 4, 5}	1,390
Zircon	--	--	13 ^{4, 6}	-- ^{r, 4, 5}	--
SENEGAL⁷					
Basalt ³	NA	116	363 ⁸	360	360
Cement, hydraulic	1,539	1,653	1,694	1,700	1,700
Clay ³	NA	19	21 ⁸	20	20
Clays, Fuller's earth (attapulgate)	121	138	195	200	200
Gold ^{e, 9} kilograms	550	600 ⁵	600 ^{5, 8}	600	600
Laterites ³	NA	112	304 ⁸	300	300
Limestone ³	NA	1,461	1,588 ⁸	1,600	1,600
Natural gas ^c thousand cubic meters	56,000	3,368 ⁵	12,638 ^{5, 8}	12,600	12,600
Petroleum:^c					
Crude oil thousand 42-gallon barrels	1	--	--	--	--
Refinery products do.	6,424 ⁵	6,400	6,400	6,400	6,400
Phosphate rock and related products:¹⁰					
Calcium phosphate-based fertilizers ¹¹	203	201	251	210 ⁵	146 ⁵
Crude rock:					
Aluminum phosphate	34	4	4 ⁸	4	4
Calcium phosphate ¹¹	1,708	1,547	1,761 ^{5, 8, 12}	1,576 ^{r, 5}	1,451 ⁵
Phosphoric acid, P ₂ O ₅ content ¹¹	359	581	511	569	504
Salt	110	172	235	240	240
Sand ³	NA	860	2,168 ⁸	2,170	2,170

^cEstimated; estimated data are rounded to no more than three significant digits. ¹Revised. NA Not available. -- Zero.

¹Table includes data available through September 18, 2006.

²In addition to the commodities listed, The Gambia also produced a variety of construction materials (laterite, sand, and shell), but information is inadequate to make reliable estimates of output.

³Values converted from cubic meters to metric tons. Specific gravity, in grams per cubic meter--basalt, 2.8; clay, 2.55; laterites, 2.55; limestone, 2.6; and sand, 2.6.

⁴Source: Geology Department of the Republic of The Gambia.

⁵Reported figure.

⁶From sales.

⁷In addition to the commodities listed, Senegal also produced sand and gravel, and stone for local construction purposes, but information is inadequate to make reliable estimates of output.

⁸Source: Direction des Mines et de la Geologie, République du Sénégal.

⁹Government estimate of unreported production of artisanal gold.

¹⁰Industries Chimiques du Sénégal was the main producer of phosphate rock in Senegal. Phosphate rock production excludes about 200,000 metric tons per year, which is estimated to be produced from other Senegalese sources.

¹¹Source: Industries Chimiques du Sénégal.

¹²Reported number may include production from other sources besides that of Industries Chimiques du Sénégal, which was reported to be 1,472 thousand metric tons in 2003.

TABLE 2
SENEGAL: STRUCTURE OF THE MINERAL INDUSTRY IN 2005

(Thousand metric tons)

Commodity	Major operating companies and major equity owners	Location of mine facilities	Annual capacity
Attapulgit	Senegal Mines (Government, 49%, and private, 51%)	240 kilometers south of Dakar	100.
Do.	Société Senegalaise de Phosphates de Thies SA (private, 100%)	Lam Lam	NA.
Cement	Les Ciments du Sahel S.A. of Senegal (private, 100%)	Kirene plant	600.
Do.	Société Ouest Africaine des Ciments (private, 100%)	Rufisque plant	1,600.
Petroleum products	Total S.A. (54%), Royal Dutch Shell plc (23%), ExxonMobil (13%), Government (10%)	Dakar refinery	1,226.
Phosphate rock, calcium	Industries Chimiques du Sénégal Group (Government, 70%, and Indian Farmers Fertilizer Cooperative Ltd. and Southern Petrochemicals Industries Corporation Ltd., collectively, 30%)	Taiba Mine	2,000.
Do.	Société Senegalaise de Phosphates de Thies SA (private, 100%)	Lam Lam, Sebikhotane, and Allou-Kagne	NA.
Phosphoric acid	Industries Chimiques du Sénégal Group (Government, 70%, and Indian Farmers Fertilizer Cooperative Ltd. and Southern Petrochemicals Industries Corporation Ltd., collectively, 30%)	Darou I plant, Darou Khoudoss	330 P ₂ O ₅ .

NA Not available.